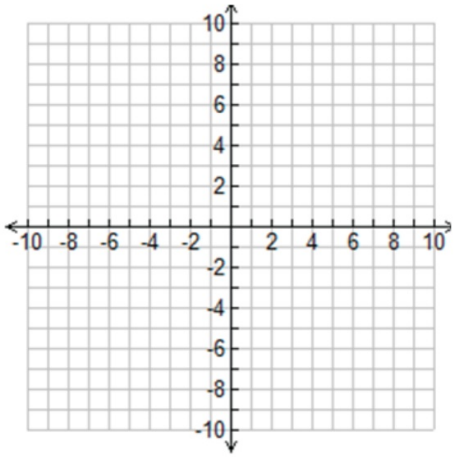
$x^3 - 7x^2 - 18x$

$x(x^2 - 7x - 18)$

$x(x-9)(x+2)$



Page 1

$x^3 - 36x$

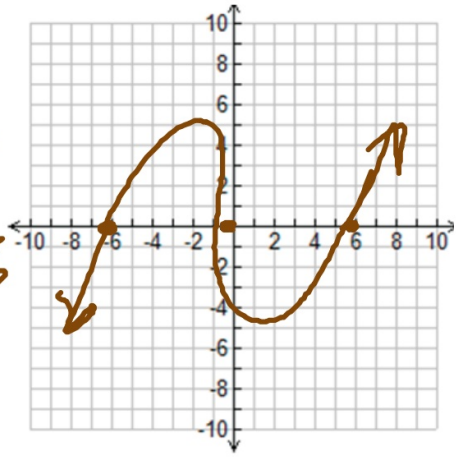
$x(x^2 - 36)$

$x(x-6)(x+6)$

$x=0 \quad x=6 \quad x=-6$

y int: (0,0)

E.B. odd (+)



Page 2

$9x^3+6x^2-3x$

$3x(3x^2+2x-1)$

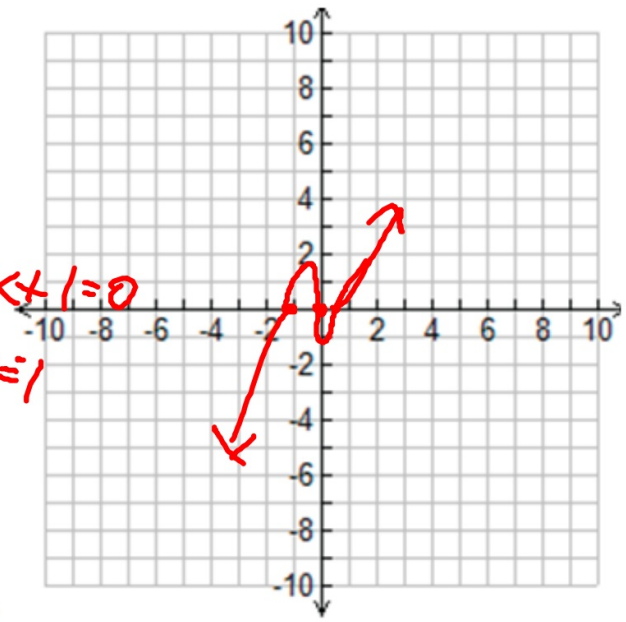
$3x(3x-1)(x+1)$

$3x=0$ $\quad 3x-1=0$ $\quad x+1=0$

$x=0$ $\quad x=\frac{1}{3}$ $\quad x=-1$

y int: (0,0)

End Beh: odd (+)



Bellwork: 2/12/13

Graph the following function:

End Beh: odd (−)

$y = -4x^3-18x^2+36x$

$-2x(2x^2+9x-18)$

$(2x^2+12x-3x-18)$

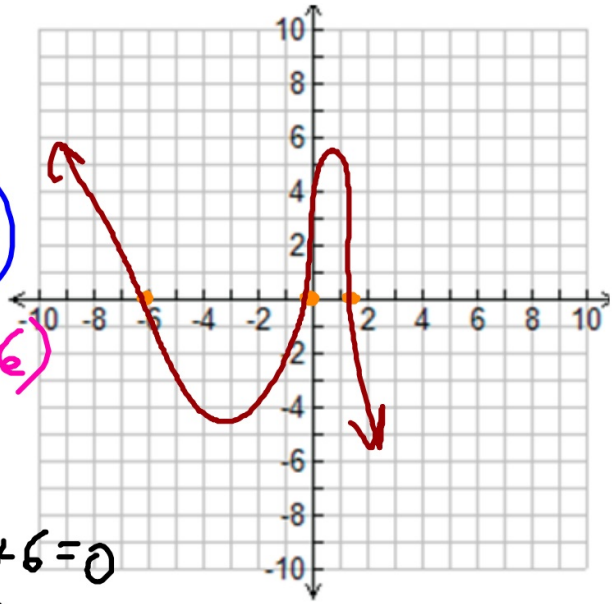
$2x(x+6)-3(x+6)$

$-2x(2x-3)(x+6)$

$-2x=0$ $\quad 2x-3=0$ $\quad x+6=0$

$x=0$ $\quad x=\frac{3}{2}$ $\quad x=-6$

y int: (0,0)



Section 5.2 - Multiplicity of roots:

If a root happens more than once in a polynomial function, then in order to keep the end behavior required, the graph must "bounce off" that root instead of going through it.

example 1: $y = (x+3)^2(x-1)(x-2)$

$(x+3)(x+3)(x-1)(x-2)$

roots: $x+3=0$ $x+3=0$ $x-1=0$ $x-2=0$

$x = \underbrace{-3, -3}_{\text{twice}}, 1, 2$

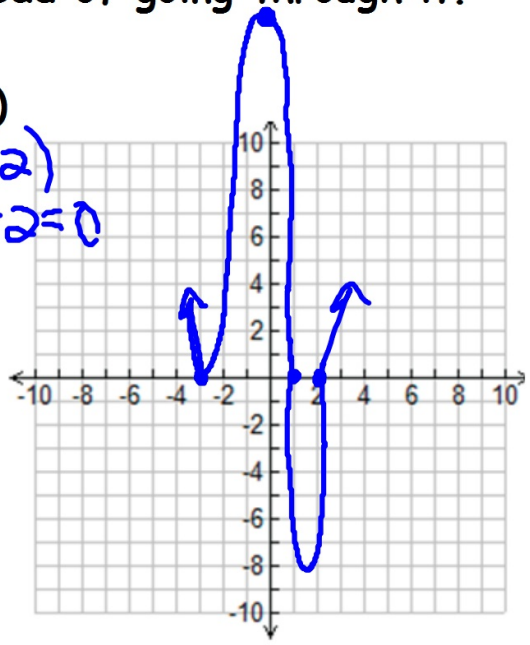
y-intercept:

$(0+3)(0+3)(0-1)(0-2)$

$(0, 18)$

end behavior: x^4

even ⊕ ↑↑



Page 5

2) $y = x^4 - 2x^3 - 8x^2$

$x^2(x^2 - 2x - 8)$

$x \cdot x(x+2)(x-4)$

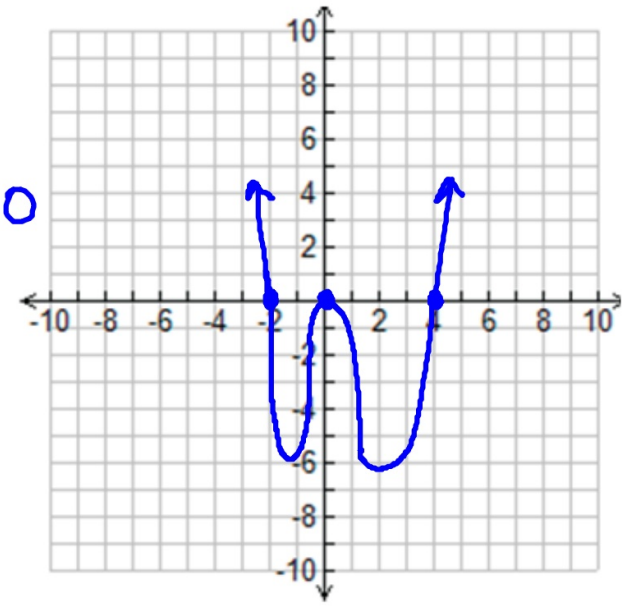
$x=0$ $x=0$ $x+2=0$ $x-4=0$

roots: $\underbrace{0, 0}_{\text{twice}}, -2, 4$

yint: $(0, 0)$

EB: x^4 even ⊕

↑↑



Page 6

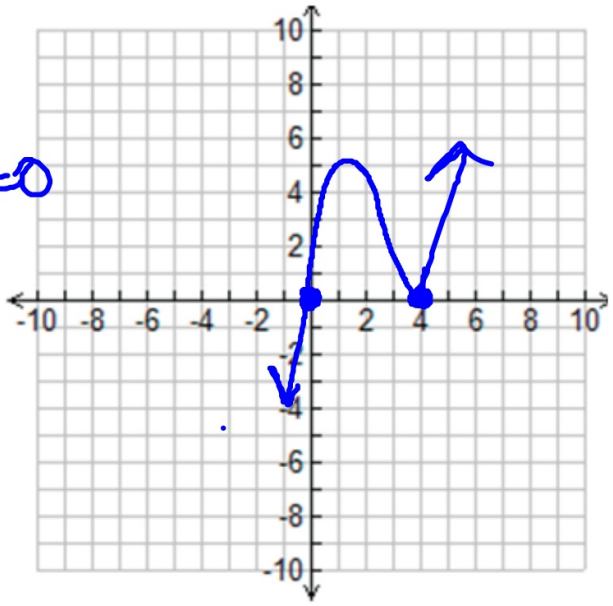
3) $y = x^3 - 8x^2 + 16x$

$x(x^2 - 8x + 16)$

$x(x-4)(x-4)$

$x=0 \quad x-4=0 \quad x-4=0$

roots: 0, 4, 4 (twice)



yint: (0,0)

EB: odd ⊕ ↓↑

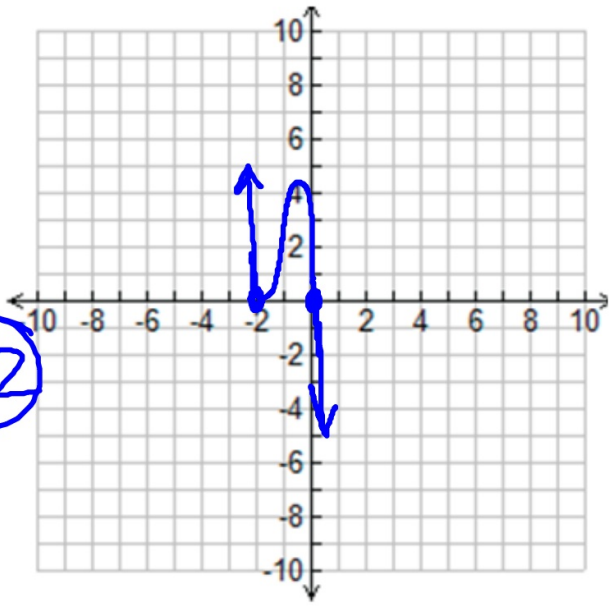
THE EXCEPTION:

4) $y = -x^5 - 4x^4 - 4x^3$

$-x^3(x^2 + 4x + 4)$

$-x \cdot x \cdot x(x+2)(x+2)$

roots: 0, 0, 0 (three) −2, −2 (twice)



yint: (0,0)

EB: odd ⊖ ↑↓

Therefore....

RULES FOR MULTIPLICITY:

If the root happens an EVEN number of times, you bounce off it.

If the root happens an ODD number of times, continue through it.

Homework: pg 293 #27-34 - find roots and MUST graph